

We claim:

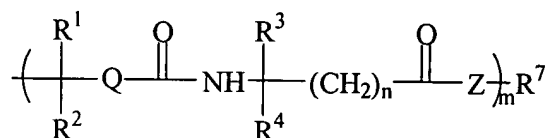
1. A telechelic (co)polymer comprising polymerized units of one or more free radically (co)polymerizable monomers,
5 an first ring-opened azlactone terminal group; and
a second terminal group selected from a xanthate group, a thioxanthate group, or a dithioester group .
2. The copolymer of claim 1 comprising two or more blocks of units obtained
10 from free radically (co)polymerizable monomers, wherein the block copolymer has first ring-opened azlactone terminal group and a second terminal group selected from a xanthate group, a thioxanthate group, or a dithioester group.
3. The (co)polymer of claim 1 comprising polymerized units obtained from
15 two or more radically (co)polymerizable monomers wherein the copolymer has a composition that varies along the length of the polymer chain from ring-opened azlactone terminal group to opposite terminal group based on the relative reactivity ratios of the monomers and instantaneous concentrations of the monomers during polymerization.
- 20 4. The (co)polymer of claim 1, wherein said (co)polymer comprises polymerized monomer units selected from the group consisting of (meth)acrylic acid; (meth)acrylates; fumaric acid (and esters), itaconic acid (and esters), maleic anhydride; styrenics; vinyl halides; (meth)acrylonitrile; vinylidene halides; vinyl esters of carboxylic acids; amides of vinyl amines; monomers containing a secondary, tertiary or quaternary
25 amino group; butadienes; unsaturated alkylsulphonic acids or derivatives thereof; 2-vinyl-4,4-dimethylazlactone, and N-vinyl pyrrolidinone and mixtures thereof; said (co)polymer having a first azlactone terminal group and a second terminal group selected from a xanthate group, a thioxanthate group, or a dithioester group.
- 30 5. The (co)polymer of claim 1 having the structure
 $Az-(M^1)_x-S-Y$, wherein

S-Y is a xanthate group of the formula $R^5-O-C(S)-S-$, a thioxanthate group of the formula $R^5-S-C(S)-S-$, or a dithioester group of the formula $R^5-C(S)-S-$, wherein

R^5 is selected from an alkyl group, a cycloalkyl group, an aryl group, a heterocyclic group or an arenyl group;

- 5 M^1 is a monomer unit derived from a radically (co)polymerizable monomer unit having an average degree of polymerization x , and

Az is a ring-opened azlactone group of the formula:



wherein

- 10 R^1 and R^2 are each independently selected from X, H, an alkyl group, a cycloalkyl group, a heterocyclic group, an arenyl group and an aryl group, or R^1 and R^2 taken together with the carbon to which they are attached form a carbocyclic ring;

R^3 and R^4 are each independently selected from an alkyl group, a cycloalkyl group, an aryl group, an arenyl group, or R^3 and R^4 taken together with the carbon to which they are attached form a carbocyclic ring;

- 15 R^7 is an organic or inorganic moiety and has a valency of m ;
 m is 1 to 8;

- Q is a linking group selected from a covalent bond, $(-CH_2)_o$, $-CO-O-(CH_2)_o-$, $-CO-O-(CH_2CH_2O)_o-$, $-CO-NR^6-(CH_2)_o-$, $-CO-S-(CH_2)_o-$, where o is 1 to 12, and R^6 is H, an alkyl group, a cycloalkyl group, an arenyl group, a heterocyclic group, or an aryl group;

Z is $-O-$, $-S-$ or $-NR^8-$, wherein R^8 is H, an alkyl group, a cycloalkyl group, an arenyl group, a heterocyclic group or an aryl group;

and n is 0 or 1.

6. The chain transfer agent of claim 5 wherein at least one of R_1 and R_2 are methyl.

7. The chain transfer agent of claim 5 wherein at least one of R_3 and R_4 is a C_1 to C_4 alkyl group.

8. The chain transfer agent of claim 5 wherein R^7 is a solid support.

9. The chain transfer agent of claim 5 wherein R^7 is the residue of a polymeric or non-polymeric, nucleophilic group-substituted compound, $R^7(ZH)_m$, in which Z is -O-, -S-, or $-NR^8$ wherein R^8 can be a H, an alkyl, a cycloalkyl or aryl, a heterocyclic group, an arenyl and m is at least one.

10. The chain transfer agent of claim 5 wherein R^7 comprises a non-polymeric aliphatic, cycloaliphatic, aromatic or alkyl-substituted aromatic moiety having from 1 to 30 carbon atoms.

11. The chain transfer agent of claim 5 wherein R^7 comprises a polyoxyalkylene, polyester, polyolefin, poly(meth)acrylate, or polysiloxane polymer having pendent or terminal reactive -ZH groups.

12. The (co)polymer of claim 1 having the structure

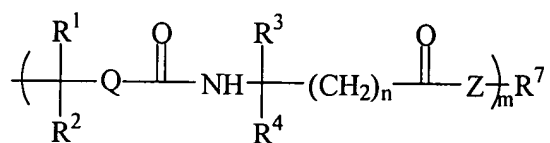
$Az-(M^1)_x(M^2)_x-(M^3)_x \dots (M^Q)_x-SY$, wherein

S-Y is a xanthate group of the formula $R^5-O-C(S)-S-$, a thioxanthate group of the formula $R^5-S-C(S)-S-$, or a dithioester group of the formula $R^5-C(S)-S-$, wherein

R^5 is selected from an alkyl group, a cycloalkyl group, an aryl group, a heterocyclic group or an arenyl group;

M^1 to M^Q are each polymer blocks of monomer units derived from a radically (co)polymerizable monomer units having an average degree of polymerization x, each x is independent, and

Az is a ring-opened azlactone group of the formula:



wherein R^1 and R^2 are each independently selected from X, H, an alkyl group, a cycloalkyl group, a heterocyclic group, an arenyl group and an aryl group, or R^1 and R^2 taken together with the carbon to which they are attached form a carbocyclic ring;

R^3 and R^4 are each independently selected from an alkyl group, a cycloalkyl group, an aryl group, an arenyl group, or R^3 and R^4 taken together with the carbon to which they are attached form a carbocyclic ring;

R^7 is an organic or inorganic moiety and has a valency of m ;

5 m is 1 to 8

Q is a linking group selected from a covalent bond, $(-CH_2-)_o$, $-CO-O-(CH_2)_o-$, $-CO-O-(CH_2CH_2O)_o-$, $-CO-NR^8-(CH_2)_o-$, $-CO-S-(CH_2)_o-$, where o is 1 to 12, and R^8 is H, an alkyl group, a cycloalkyl group, an arenyl group, a heterocyclic group or an aryl group;

10 Z is $-O-$, $-S-$ or $-NR^8-$, wherein R^8 is H, an alkyl group, a cycloalkyl group, an arenyl group, a heterocyclic group or an aryl group;

And n is 0 or 1.

13. The chain transfer agent of claim 12 wherein at least one of R_1 and R_2 are methyl.

15

14. The chain transfer agent of claim 12 wherein at least one of R_3 and R_4 is a C_1 to C_4 alkyl group.

15. The chain transfer agent of claim 12 wherein R^7 is a solid support.

20

16. The chain transfer agent of claim 12 wherein R^7 is the residue of a polymeric or non-polymeric, nucleophilic group-substituted compound, $R^7(ZH)_m$, in which Z is $-O-$, $-S-$, or $-NR^8$ wherein R^8 can be a H, an alkyl, a cycloalkyl or aryl, a heterocyclic group, an arenyl and m is at least one.

25

17. The chain transfer agent of claim 12 wherein R^7 comprises a non-polymeric aliphatic, cycloaliphatic, aromatic or alkyl-substituted aromatic moiety having from 1 to 30 carbon atoms.

18. The chain transfer agent of claim 12 wherein R^7 comprises a polyoxyalkylene, polyester, polyolefin, poly(meth)acrylate, or polysiloxane polymer having pendent or terminal reactive $-ZH$ groups.

30

19. The (co) polymer of claim 12 having a star, comb, block, or hyperbranched structure.

5 20. The (co) polymer of claim 19 having pendent, nucleophilic functional groups.

21. The (co)polymer of claim 20 comprising interpolymerized monomer units having pendent, nucleophilic functional groups.

10